

HOW TO READ A VARROA TRAY

It's hard to imagine that anything positive could possibly have come out of the accidental introduction of varroa into the UK in 1992. But, as the saying goes, every cloud has a silver lining, and I would argue that the now widespread use of varroa mesh floors with removable bottom boards has been a positive outcome for beekeeping in Britain.

True, some bees are still kept on solid floors, but most new equipment these days is sold with a mesh floor and a pull-out inspection tray.



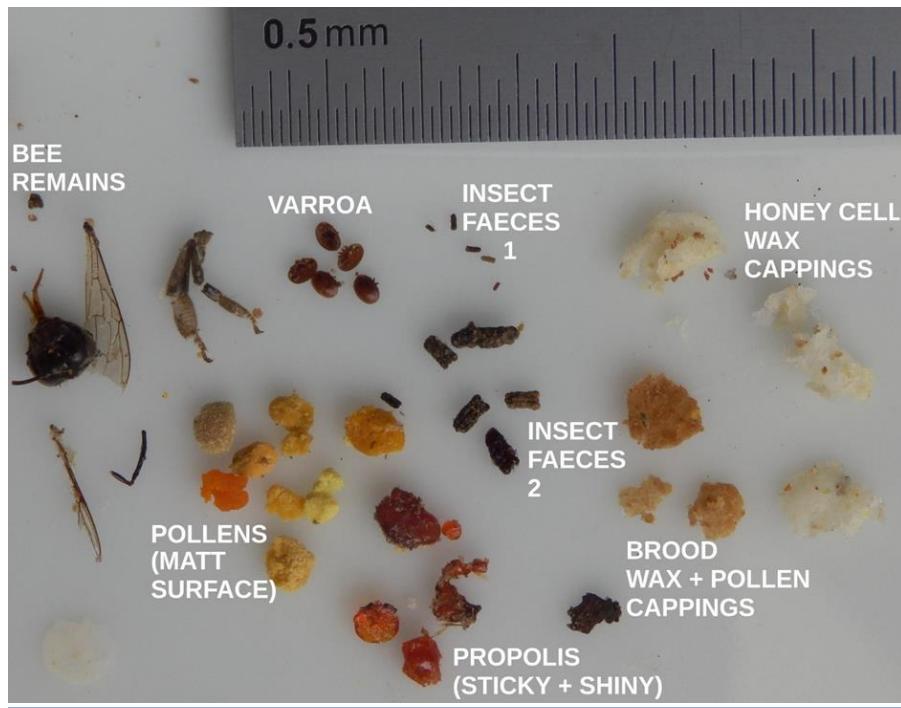
This arrangement allows the detritus produced within the hive to fall through onto the tray and, if this debris is looked at with an experienced eye then it is possible to work out what is going on in the colony without having to pull any frames out.

Clearly, when the weather is good there is no substitute for a thorough inspection of the colony, but during the winter months and early spring when weather conditions can be poor either through cold or rain or both then an examination of the bottom board can be an invaluable aid to the beekeeper as to where exactly the colony is in its development.

In this handout we will look at the type of things you can expect to find on the tray and also consider how the position of the debris can be important as well.

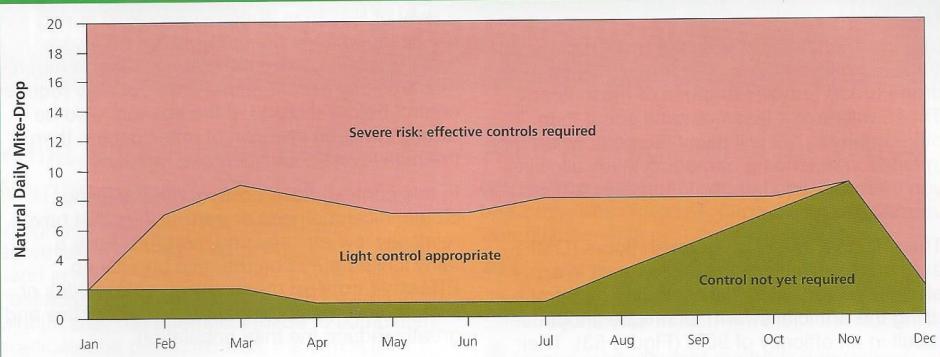
It's worth pointing out at this stage that the tray needs to be regularly checked (say weekly), and cleaned after each inspection. Failure to do this can lead to a disgusting thick layer of muck that is of no diagnostic value and will be a reservoir of infection to the colony.

So, let's have a look at what we can expect to find on our varroa tray.



- ✓ **VARROA**..... This goes without saying. The mesh floor and tray system are there to catch any varroa that are groomed off or fall off the bees, as well as any dead ones that simply drop through. Assuming that the colony has not been given a varroa treatment recently the amount of varroa on the tray can be counted. When this number is divided by the number of days that the tray has been in place, the resulting figure is referred to as the natural daily drop. You can then refer to a graph like the one below (from the National Bee Unit managing varroa booklet) and decide if the level of varroa in your colony is within safe limits or whether it needs a treatment.

Figure 54: Using mite drop monitoring to decide appropriate level of controls to employ



- ✓ **INSECT FAECES**..... When we open our hives, we are often aware of the other creatures that share space with our bees. Collectively they can be considered as inquilines, neither causing harm nor giving benefit to the colony. Indeed, the only visiting creature likely to cause harm is the wood ant (*Formica rufa*) which can carry chronic bee paralysis virus. Many inquilines live around the periphery of the colony and some on the varroa tray itself, eking out a living from the detritus on the board. Woodlice and earwigs are particularly common and leave their poo on the tray where it can often be confused with dead varroa mites.
- ✓ **WHITE DUST/SUGAR LIKE GRAINS**..... This is typically found in straight parallel lines and mirror the gaps between the frames above.



When you see this, you can be sure that the bees are working their stores of capped honey, dropping the wax cappings and some of the

honey onto the tray below. This is particularly pronounced when they are working back ivy honey stores because the honey is more crystalline, indeed sometimes the bees have to partially breakdown the cell wall to get to the ivy. This leads to larger particles of wax being found on the tray. The amount of wax and honey crystals on the board is a guide to how much food the colony is using and may make you think about having to offer some extra feed, normally in the form of fondant on the crown board feed hole.

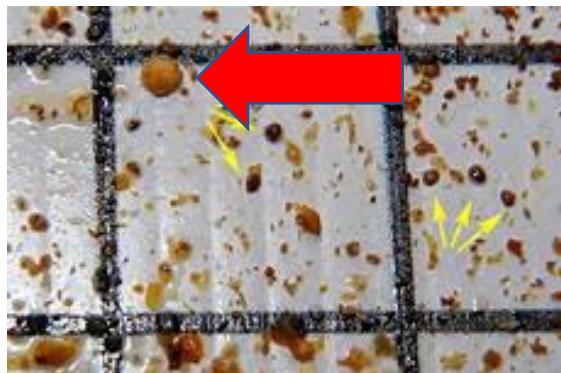
- ✓ **BROWN DUST AND GRAINS.....**This is particularly interesting for the beekeeper because it is the chewed up cappings found over sealed brood. As such it means that the colony is both rearing brood and having new bees emerging from their cells.



In the picture above, we can again see the straight parallel lines pattern produced in the colony, showing that brood is emerging from the cells in the frames above. It is also worth noting that the longer the lines the bigger the brood area. This picture also shows that the colony has a high varroa

mite count, which may be due to the recent application of a varroacide, or more worryingly that the colony has a high level of mites. Interestingly, the debris line on the far left of the picture appears to have a higher percentage of white honey type cappings suggesting that the frame above contained more stored food and less sealed brood.

- ✓ **ACTUAL CAPPINGS**..... Sometimes a capping from a brood cell will find it's way onto the varroa tray without being chewed up. These require a closer inspection to see what shape they have.



Domed capping from a drone cell

This domed capping almost certainly came from a drone cell, but it must be put into the context of a timeframe. Drone brood is common enough during the breeding season of summer, but if this were seen in winter or early spring it is unlikely that the colony would be making drone yet and so this may well indicate that the queen had become a drone layer over the winter period. It is unlikely that you could do anything about this in early spring but you could at least prepare to sort it out as soon as the weather was good enough.

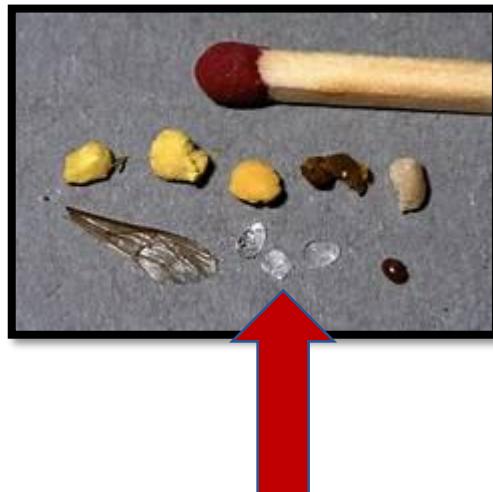
- ✓ **WAX SCALES**..... We know that bees produce wax from 4 pairs of glands under their abdomen.

As the scales are passed up from the abdomen to the mouth to be



chewed up, the bees sometimes lose their grip on them and they fall onto the tray.

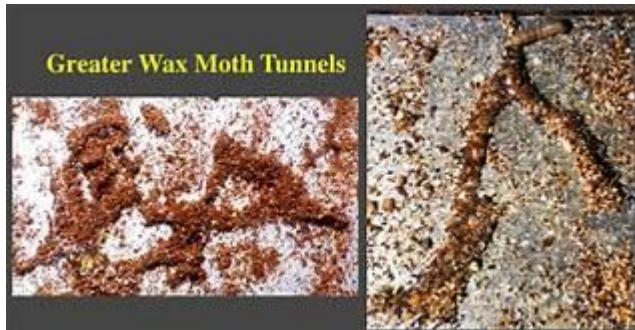
Although they are transparent, they are easy to spot. You can gauge their size from the picture below.



As bees use wax to construct their nest, seeing scales on the tray is a sure sign that your bees are building comb.

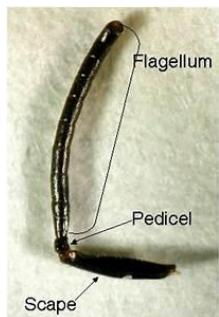
- ✓ **POLLEN**..... Most beekeepers will be familiar with seeing bees entering their hives, carrying clumps of pollen on their back legs. When the forager bees get inside the hive, they transfer these pollen loads into empty cells. However sometimes a pollen load is dropped and it finds its way onto the tray. This is interesting to the beekeeper for 2 reasons. Firstly, fresh pollen being brought in by the colony is generally regarded as a good indicator that brood is being reared and secondly an examination of the pollen either by eye or through a microscope can help determine what the bees are feeding on at that particular time.
- ✓ **WAX MOTH**..... Most beekeepers are familiar with the 2 species of wax moth that can infest their colonies. Lesser wax moth (*Achroia grissella*) and greater wax moth (*Galleria mellonella*) are both able to thrive where debris is allowed to build up in the hive. This is particularly noticeable if the varroa tray is not cleaned regularly. Eggs laid by the adult moths soon hatch into larvae which burrow

and eat their way through the accumulated waste. Their presence can be noticed by the tale tale tubes of frass and the cobwebby structure of silken threads that they spin. Once these larvae have pupated and become flying adults they are free to infest the hive itself or indeed other colonies in the apiary.



✓ **HONEYBEE BODY PARTS**..... This seems like a strange one to put in, but as we saw in the picture on page 2 you quite often get the remains of dead bees (wings, legs heads etc) finding their way onto the tray. Given that there will always be some bees dying in the hive I would not normally consider this to be important. However, if the amount became larger than normal, I would be suspicious that the colony was being robbed either by other bees or by wasps. This would require further observation of the colony and remedial action taken if necessary, either reducing the hive entrance or even relocating the colony elsewhere.

The other body part to watch out for is pupal antennae. These are seen as small white "ticks". That is ticks for correctness as opposed to itchy ticks!!



Here we can see an antenna from an adult bee which has darkened, what you will be looking for is the same shape only a translucent white colour.

What can we deduce from this?

The bee behaviour that leads to this is quite clear. The bees chew away the wax capping covering the developing pupa and then remove it. As the pupae are aligned head outwards the bees tend to try and pull them out by their antennae, which often become detached, hence they are found on the varroa floor.

What is more debateable is the reasoning behind this behaviour.

Here we can see a pupa being removed head first, and a varroa mite being exposed.



Some beekeepers believe that this is what is known as hygienic behaviour, whereby the bees detect that the developing pupa has something wrong with it and remove it from the hive. It is probable that all bees show a degree of hygienic behaviour, but some colonies show higher levels of it than others. It is these colonies that are being promoted as being able to cope with varroa without treatment. This may well be a step in the right direction, but many scientist's say that this behaviour on its own is not enough to stop the need for treatments altogether.

There is another reason that bees remove pupae from their cells and that is that the colony may be critically short of food. It is well recorded that in times of dearth the bees will regulate the amount of brood they have to care for by sacrificing some of it. So, it may well be worth just checking those feed stores to be on the safe side.

- ✓ **CHALK BROOD**..... This is a fungal disease that affects honey bee larvae, causing them to become "mummified" into chalky pellets.



They are normally found on the mesh floor, but occasionally they can get

pushed through onto the varroa tray, where they become mixed up with the other debris. The condition is normally at its most prevalent when the developing brood is not kept warm enough, so late frosts in springtime can trigger a bout of chalkbrood.

Normally good strong colonies of bees can deal with an infection of chalkbrood by clearing out the dead pupal mummies. However, weaker colonies may get overwhelmed by the disease. So, again by checking the tray for signs of chalkbrood early on in the year gives you the chance to keep a watchful eye out later in the season.

- ✓ **INERT MATERIAL**..... This is interesting, in that bees are programmed to keep their nest area clean and tidy and so when we add something to the hive, they have a natural tendency to try and remove it. This may be something as benign as the cling film used to wrap fondant in, to the medium used to hold a thymol varroa treatment.



One of the strangest things we ever saw was the shredding and removing of rubber bands used to hold some wild comb into an empty frame.

Hopefully, we have been able to show that the varroa tray is so much more than just an insert to catch varroa. With practise it can be used as a very effective diagnostic tool.

Even when the weather is not good enough to open up the hive to inspect the colony, by analysing the accumulated trash on the floor it is possible to form an opinion as to what the current situation is inside the hive and what type of behaviour your bees are engaging in at present.

If the signs indicate that stores may be running low it is possible to get some feed on the bees straight away.

If, however, you suspect a more long-term problem, because of its early diagnosis it gives you plenty of time to get things organised for when the weather is better.

Buckfast Bee Dept 2019